WE CLAIM:

1. A datastructure comprising:

a) genetic information that describes a plurality of genetic markers on at least two different, non-homologous chromosomes of a subject or a reference to such information; and

b) a systems biology map of the subject or a reference to such a map, e.g., wherein the map comprises information about neural circuit function in the brain.

2. A datastructure comprising:

a systems biology map of a subject wherein the map comprises quantitative information about neural circuit function in the brain, the information indicating function of a plurality of regions of the brain during a plurality of mental processes.

3. A datastructure comprising:

a systems biology map of a subject wherein the map comprises a plurality of values corresponding to a set of continuous variables, wherein the variables of the set correspond to different regions of the brain, and the values that correspond to the variables indicate function of respective regions during a mental process.

4. The datastructure of claim 1 wherein the genetic information comprises information about nucleotide identity for a plurality of genetic markers.

5. The datastructure of claim 1 wherein the genetic information comprises information about methylation status for a plurality of genetic markers.

6. The datastructure of claim 1 wherein the genetic information comprises information about parental origin for a plurality of genetic markers.

7. The datastructure of claim 1 wherein the genetic information comprises information about chromatin structure or accessibility for a plurality of genetic markers.

8. The datastructure of claim 1 wherein the genetic information comprises information about a haplotype, microsatellite marker, sequence tagged site, or SNP.

9. The datastructure of claim 1 wherein the genetic information comprises information about a chromosomal deletion, inversion, transversion, rearrangement, trisomy, or other chromosomal abnormality.

10. The datastructure of claim 1 further comprising c) information that is an index corresponding to the subject.

11. The datastructure of claim 10 wherein the index corresponding to the subject is randomized, encrypted, or anonymous.

12. The datastructure of claim 10 wherein the index corresponding to the subject identifies the subject.

13. The datastructure of claim 10 wherein the index corresponding to the subject associates the subject with familial or other pedigree information.

14. The datastructure of claim 1 wherein the systems biology map comprises information obtained by imaging.

15. The datastructure of claim 1 wherein the systems biology map comprises structural information.

16. The datastructure of claim 1 wherein the systems biology map comprises functional information.

17. The datastructure of claim 1 wherein the systems biology map comprises information about activity in a plurality of brain regions in at least one paradigm.

18. The datastructure of claim 1 wherein the systems biology map comprises information about activity in a plurality of brain regions in at least two paradigms.

19. The datastructure of claim 1 wherein the plurality of brain regions comprises at least ten, twenty, or thirty brain regions.

20. The datastructure of claim 19 wherein at least ten, twenty, or thirty of the brain regions of the plurality are selected from Table 1.

21. The datastructure of claim 1 wherein the information for each of the brain regions is independent of reference to a coordinate frame.

22. The datastructure of claim 1 wherein the information for the brain regions is organized categorically.

23. The datastructure of claim 21 wherein the information for each of the brain region is indexed according to index values for each of a set of predefined regions.

24. The datastructure of claim 17 wherein the paradigm interacts with the informational backbone for motivation.

25. The datastructure of claim 24 wherein the paradigm interacts with a reward/aversion mechanism in a normal subject.

26. The datastructure of claim 17 wherein the at least two paradigms interact with overlapping, but non-coextensive regions of the brain.

27. The datastructure of claim 17 wherein the at least one paradigm is selected from the set consisting of:

a social reward paradigm,

a CPT / probability paradigm,

a physiological aversion / pain paradigm,

a mental rotation paradigm,

an emotional faces paradigm, and

a monetary reward paradigm.

28. The datastructure of claim 17 wherein the information about activity for at least one of the regions comprises deviations from a reference (e.g., percentage differences, ratios, and subtractive values).

29. The datastructure of claim 1 wherein the systems biology map comprises a plurality of matrices, each matrix comprising information about neural activity in a plurality of defined brain regions during different paradigms.

30. A database comprising: a plurality of records, wherein each record of the plurality includes: the datastructure of claim 1;

and the records of the plurality include records for a plurality of unrelated individuals and records for at least one family member of each of the plurality of unrelated individuals.

31. A database comprising: a plurality of records, wherein each record of the plurality includes: the datastructure of claim 1, wherein the database comprises records for at least 50, 100, 200, 500, 1000, 3000 or 30,000 human subjects.

32. The database of claim 31 wherein one or more of the subjects has a clinical diagnosis of a neurological and/or psychiatric disorder.

33. The database of claim 31 wherein one or more of the subjects has a clinical diagnosis of schizophrenia, manic depression, bipolar disorder, addictions,

obsessive-compulsive disorder, anxiety/paranoia, autism, schizo-affective disorder, delusional disorder, psychosis, antisocial personality disorder, or anorexia/bulimia nervosa.

34. A method of evaluating information about neural processing, the method comprising:

providing a database that comprises structural and/or functional information about brain activity for each of a plurality of subjects; and

classifying the subjects based on the information.

35. The method of claim 34 wherein the database comprises information about brain activity during at least two different mental processes.

36. The method of claim 34 wherein the classifying comprises selecting a subset of variables, and sorting the subjects as a function of the variables of the subset.

37. The method of claim 36 wherein the subset of variables is selected based on the information content of each of the variables.

38. The method of claim 36 wherein the subset of variables is selected based on correlations among the variables.

39. The method of claim 36 wherein each variable is associated with an activity of a particular region of the brain during a paradigm.

40. The method of claim 34 wherein the classifying comprises generating a tree.

41. The method of claim 40 wherein the tree is a binary tree.

42. The method of claim 40 wherein each node of the tree corresponds to a variable associated with a particular region of the brain and a paradigm.

43. The method of claim 34 wherein the plurality of subjects comprises at least 50, 100, 200, 500, 1000, or 3000 human subjects.

44. The method of claim 34 wherein the classifying is recursive.

45. The method of claim 34 wherein the classifying comprises generating an association rule algorithm.

46. The method of claim 45 wherein the association rule algorithm is non-parametric.

47. The method of claim 34 wherein the classifying comprises classification tree analysis.

48. The method of claim 34 further comprising comparing genetic information among subjects of at least one class.

49. The method of claim 48 wherein the comparing of genetic information comprises evaluating a statistic for association of one or more genetic markers among the subjects of the at least one class.

50. The method of claim 34 wherein the information comprises quantitative volumetric data evaluated by tomography.

51. The method of claim 34 wherein the quantitative volumetric data comprises a plurality of matrices.

52. The method of claim 34 wherein the classifying comprises hierarchical clustering, Bayesian clustering, k-means clustering, self-organizing maps, or shortest path analysis.

53. The method of claim 34 wherein the subjects are social non-human animals.

54. The method of claim 34 wherein the subjects are humans or non-human primates.

55. The method of claim 34 wherein the subjects are voles.

56. A method comprising:

providing a database that comprises quantitative information about brain function for each of a plurality of subjects;

objectively identifying a subset of subjects from the plurality of subjects according to similarity of brain function.

57. The method of claim 56 wherein a plurality of subsets are objectively identified.

58. The method of claim 56 wherein the identifying comprises objectively selecting a subset of quantitative variables whose values vary among the plurality of subjects.

59. The method of claim 56 further comprising receiving additional quantitative information about brain function for at least one additional subject, and evaluating whether the additional subject is a member of the identified subset.

60. The method of claim 56 wherein the identifying comprises generating one or more association rules that model the subset.

61. The method of claim 56 wherein the identifying comprises generating a decision tree that models the subset.

62. The method of claim 56 wherein the identifying comprises generating a probability function that models the subset.

63. The method of claim 56 wherein the database comprises systems biology maps.

64. The method of claim 63 wherein the systems biology maps comprises values determined evaluating subjects during at least two different mental processes.

65. A data-tree comprising a plurality of nodes, wherein each non-terminal node includes (i) a reference to a variable or variable class, wherein the variable or variable class is a parameter of brain function in the subject, (ii) optionally, a node level, and (iii) criterion for distinguish descendants of the node.

66. The tree of claim 65 wherein the tree is a binary tree.

67. The tree of claim 65 wherein each non-terminal node comprises a pointer to one or more descendant nodes.

68. The tree of claim 65 wherein, for at least some of the nodes of the plurality, the criterion is an association rule.

69. The tree of claim 65 wherein each descendant node comprises a probabilistic or statistical function that differentiates it from a sibling descendant node.

70. The tree of claim 65 wherein the nodes are ordered as function of variables that they respectively reference, e.g., as a function of information content or autocorrelations for the respective variables.

71. The tree of claim 65 wherein at least one of the variables or variable classes refers to a brain region in a paradigm.

72. A datastructure comprising a plurality of matrices, wherein each matrix comprises functional information obtained during a mental process of a subject, the matrix comprising at least two dimensions, a first dimension that identifies regions of the brain, and one or more values for each region, wherein the values correspond to activity levels in the respective regions during the mental process.

73. The datastructure of claim 72 wherein a second dimension identifies a hemisphere.

74. The datastructure of claim 72 that comprises a first matrix that comprises functional information obtained during a first paradigm and a second matrix that comprises functional information obtained during a second paradigm.

75. The datastructure of claim 72 that comprises a first matrix that comprises first values that depend on a native dataset obtained by imaging the subject at multiple timepoints, wherein the first values are independent of information from other subjects and a second matrix that comprises second values that depend on the same native dataset, wherein the second values are determined or are selected as a function of information from other subjects.

76. The datastructure of claim 75 wherein the second values are selected based on location of activation centers detected in an aggregate of image information from a plurality of other subjects.

77. The datastructure of claim 75 wherein the first values are determined and/or selected as a function of location of activation centers detected by clustering signal changes from a baseline, wherein the signal changes are independent of information from any other subject.

78. A method of providing a systems biology map, the method comprising:

providing native information about brain function of a subject during a mental process, the information comprising quantitative data for signals in at least a plurality of regions;

comparing signals during the mental process to reference signal parameters to locate regions of activity; and

populating a datastructure with information about signals at least in the regions of activity.

79. The method of claim 78 wherein the reference signal parameters is function of a baseline for the subject.

80. The method of claim 78 wherein the reference signal parameters are a function of signals from a population of subjects.

81. The method of claim 78 wherein locating regions of activity comprises clustering signal changes relative to the reference signal parameters.

82. The method of claim 81 wherein the clustering comprises defining foci in a three-dimensional coordinate space.

83. The method of claim 78 wherein the comparing comprises generating a statistical map.

84. The method of claim 83 wherein the statistical maps are a function of correlation between a gamma function and signal changes.

85. A method of providing a systems biology map, the method comprising:

providing native datasets about brain function for a plurality of subjects during a mental process, the information comprising quantitative data for signals in at least a plurality of regions;

combining information from the native datasets to provide an aggregate dataset; and

localizing regions of activity in the aggregate dataset.

86. The method of claim 85 wherein the combining comprises transforming native datasets to a reference coordinate frame.

87. The method of claim 86 wherein the combining further comprises averaging the native datasets.

88. The method of claim 86 wherein the combining further comprises producing a statistical map.

89. The method of claim 85 wherein the localizing comprises clustering signal changes in the aggregate dataset.

90. A method of providing a systems biology map, the method comprising:

providing native datasets about brain function for a plurality of subjects during a mental process, the information comprising quantitative data for signals in at least a plurality of regions;

for each subject, producing a first systems biology map from the native dataset of the particular subject, wherein the first system biology map is independent of the native datasets from the other subjects, and a second systems biology map that is a function of regions of activity detected in an aggregate dataset from the plurality of subjects.

91. A method of diagnosing a subject, the method comprising:

providing information about structure and/or function of the brain of the subject, the information comprising quantitative data for at least a plurality of regions; and

objectively evaluating the information using quantitative criteria; and

providing a diagnosis for the subject based on results of the evaluating.

92. The method of claim 91 wherein the quantitative data comprises information about brain function during a plurality of mental processes.

93. The method of claim 92 wherein at least one mental process comprises a paradigm.

94. The method of claim 93 wherein the paradigm evokes the information backbone for motivation.

95. The method of claim 91 wherein the evaluating comprises comparing the information about the subject to a decision tree.

96. The method of claim 95 wherein the comparing comprises evaluating a probability of association for the information about the subject and one or more terminal nodes of the tree.

97. The method of claim 95 wherein the comparing comprises evaluating a probability of association for the information about the subject and each bifurcation of the tree.

98. The method of claim 91 wherein the evaluating comprises evaluating a probability that the information about the subject is within a classification, wherein the classification is a function of quantitative activity measures for a plurality of brain regions.

99. A method of providing a systems biology map, the method comprising

imaging regions of the brain of a subject while at least one of the regions is active to obtain a native dataset that includes information about activity in one or more of the regions at a plurality of temporal instances; and

condensing the native dataset at least 10 fold to provide a condensed dataset that comprises quantitative information about at least some of the imaged regions

100. The method of claim 99 wherein the condensed dataset comprises information about one or more activity peaks in at least some of the imaged regions

101. The method of claim 99 wherein the condensed dataset discards time resolution for at least 50% of the regions.

102. The method of claim 99 wherein the regions are imaged by fMRI.

103. The method of claim 99 wherein the condensed dataset comprises information that can be represented as a matrix, one dimension of which differentiates among regions of the brain.

104. A method of providing a systems biology map, the method comprising

imaging regions of the brain of a subject during a mental process to obtain a native dataset that includes information about brain function; and

populating variables in a matrix by extracting quantitative information from the native dataset.

105. The method of claim 104 wherein the matrix comprises at least two dimensions.

106. The method of claim 104 wherein the first dimension resolves different regions of the brain.

107. The method of claim 104 wherein the second dimension resolves the left and right hemisphere of the brain.

108. The method of claim 104 wherein the matrix comprises a third dimension.

109. The method of claim 104 wherein information about one or more activations in a given region and hemisphere are provided at respective variables of the matrix.

110. The method of claim 104 wherein the information comprises a list, the members of the list being stored at different positions along a third dimension of the matrix

111. The method of claim 104 wherein the matrix does not provide information about time, e.g., the information about the one or more activations is not time-resolved.

112. A method of providing a systems biology map, the method comprising

receiving a native dataset that includes imaged information about brain function of a subject; and

populating variables in a matrix by extracting quantitative information from the native dataset.

113. A method of providing a systems biology map, the method comprising

imaging regions of the brain of a plurality of subjects; and

transforming image information to a reference coordinate space;

selecting a subset of regions for which activations are detected among the plurality of subjects; and

producing a condensed dataset for each subject of the plurality wherein the condensed dataset is smaller than the native dataset for each subject of the plurality and retains information about the selected subset of regions.

114. The method of claim 113 wherein selecting the subset comprises averaging the transformed image information and evaluating statistically significant changes relative to results of the averaging.

115. The method of claim 113 wherein selecting the subset comprises selecting regions that differ from a reference (e.g., a baseline obtained prior or after the mental process).

116. A method comprising:

receiving functional information about neural circuit activity, the information being obtained by imaging a plurality of brain regions in a subject.

generating a dataset that associates each of a plurality of brain regions with quantitative information, wherein the quantitative information comprises lists of activation peaks and each list is associated with at least one of the brain regions.

117. The method of claim 116 wherein the list is rank ordered.

118. The method of claim 116 wherein the dataset is represented as a matrix.

119. The method of claim 116 wherein the dataset is represented as a vector.

120. The method of claim 118 wherein members of each list are positioned or referenced in consecutive cells along one axis of the matrix.

121. The method of claim 116 wherein the dataset is stored in a relational database, e.g., as a table.

122. A method for evaluating a treatment, the method comprising:

evaluating a subject to produce a first systems biology map of the subject;

treating the subject; and

evaluating the subject to produce a second systems biology map of the subject;

wherein the first and second systems biology maps comprise quantitative information about brain function in a plurality of brain regions during at least one mental process.

123. The method of claim 122 wherein the treatment comprises administering an agent to the subject.

124. The method of claim 123 wherein the agent is a pharmaceutical, a narcotic, an addictive substance, or a non-addictive substance.

125. The method of claim 122 wherein the treatment comprises providing a non-invasive therapy to the subject.

126. The method of claim 125 wherein the non-invasive treatment comprises hypnosis, music, video, visual, superficial contacts, exercise, or physical pressure.

127. The method of claim 122 wherein the systems biology maps comprise information about activity in a plurality of brain regions in at least one paradigm.

128. The method of claim 122 wherein the systems biology maps comprise information about activity in a plurality of brain regions in at least two paradigms.

129. The method of claim 122 wherein the plurality of brain regions comprises at least ten, twenty, or thirty brain regions.

130. The method of claim 122 wherein at least ten, twenty, or thirty brain regions of the plurality are selected from Table 1.

131. The method of claim 122 wherein the information for each of the brain region is independent of reference to a coordinate frame.

132. The method of claim 122 wherein the information for the brain regions is organized categorically.

133. The method of claim 122 wherein the information for each of the brain regions is indexed according to index values for each of a set of predefined regions.

134. The method of claim 127 wherein the paradigm triggers the informational backbone for motivation.

135. The method of claim 127 wherein the paradigm triggers reward/aversion mechanism in a normal subject.

136. A method comprising:

providing a dataset that comprises quantitative information about brain activity during at least two paradigms for each of a plurality of subjects;

evaluating a parameter that is a continuous function of at least two components of the quantitative information, the at least two components being associated with different paradigms; and

analyzing a statistic for association between the parameter and an allele for one or more genetic loci.

137. The method of claim 136 wherein analyzing the statistic comprises non-parametric linkage analysis.

138. A method of evaluating information, the method comprising:

obtaining a group of human subjects;

imaging the CNS of each subject while the respective subject is exposed to information;

evaluating correlation between a characteristic of neural circuit activity of the subjects and alleles present at one or more genetic markers; and

providing an evaluation of the information as a function between the characteristic and the frequency of an allele in a population.